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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/605,442	06/28/2000	Leon R. Barstad	50439-2	5430
21874	7590	04/29/2004	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			NICOLAS, WESLEY A	
			ART UNIT	PAPER NUMBER
			1742	
DATE MAILED: 04/29/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	09/605,442	BARSTAD ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Wesley A. Nicolas	1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 15 March 2004.

2a)  This action is **FINAL**.                    2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4)  Claim(s) 124-136 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5)  Claim(s) \_\_\_\_\_ is/are allowed.  
6)  Claim(s) 124-136 is/are rejected.  
7)  Claim(s) \_\_\_\_\_ is/are objected to.  
8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3)  Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5)  Notice of Informal Patent Application (PTO-152)  
6)  Other: \_\_\_\_\_.  
\_\_\_\_\_

### **DETAILED ACTION**

This is in response to the RCE filed March 15, 2004 and the 131 Declaration filed on February 13, 2004. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 124-153 are currently pending in this application.

#### **Continued Examination Under 37 CFR 1.114**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 15, 2004 has been entered.

#### **Terminal Disclaimer**

2. The terminal disclaimer filed on July 29, 2002 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of Application No. 09/313,045, has been reviewed and is accepted. The terminal disclaimer has been recorded. As such, there are no double-patenting rejections pertaining to Application No. 09/313,045.

**Response to Declaration**

3. The declaration filed on February 13, 2004 under 37 CFR 1.131 is sufficient to overcome the Landau et al. (6,379,522) reference.

**Claim Rejections - 35 USC § 102**

4. Claims 124-136 are rejected under 35 U.S.C. 102(e) as being anticipated by Andricacos et al. (6,709,562).

Claims 124-132 are rejected because Andricacos et al. teach a method for plating a semiconductor microchip wafer substrate, comprising:

- electrolytically depositing copper onto a semiconductor microchip wafer substrate (Abstract: “integrated circuit chips” and ),
- having microvias or trenches (col. 2, “trenches or holes”), from an electroplating composition that comprises at least one soluble copper salt (col. 7, “cupric sulfate”), an electrolyte (col. 7), and
- one or more brightener compounds having a molecular weight of about 1000 or less and that are present in a concentration of at least about 1.5 mg per liter (col. 7, “Brightener” with a concentration of 3% by volume. Since 1 mg/L = 0.0001% wt/vol, than 3% vol. ~ 4000 mg/L) of the electroplating composition.

Claim 133 is rejected because Andricacos et al. teach that the electroplating composition further comprises a suppressor agent (col. 6 and claims 10 and 28: “polyether”).

Claim 134 is rejected because Andricacos et al. teach that the suppressor agent is a polyether (col. 6 and claims 10 and 28: "polyether").

Claim 135 is rejected because Andricacos et al. teach that the electroplating composition further comprises a halide ion source (col. 7, "chloride").

Claim 136 is rejected because Andricacos et al. teach that the microchip wafer substrate is electrically attached to a cathode of the system (col. 7).

### **Claim Rejections - 35 USC § 103**

5. Claims 137-153 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Andricacos et al. (6,709,562), and further in view of Dahms et al. (5,433,840).

Andricacos et al. are as applied, argued, and disclosed above and incorporated herein but fail to specifically teach that the sulfide compound is used as a brightener, or of the specific additive of 3-mercaptopropane-1-sulfonate at a concentration of above 1.5 mg/L. It should be noted that Andricacos does teach the use of 3-mercaptopropane-1-sulfonic acid (see col. 6) but not at the higher concentration.

Dahms et al. teach the use of a sulfide brightener such as 3-mercaptopropane-1-sulfonate (Table 2).

Claims 137-139 are rejected because it would have been obvious and within the ordinary skill in the art at the time the invention was made to have modified Andricacos et al. to use the additive of Dahms et al. because Dahms et al. teach the use of a brightener additive such as 3-mercaptopropane-1-sulfonate (Table 2) would also

strengthen the conductors on the substrate (col. 1, lines 7-12) thereby providing a more durable interconnect and plated layer.

Claim 140 is rejected because Andricacos et al. teach that the additive is a bisulfopropyl disulfide compound (col. 6, “organic sulfide compounds of the formula  $XR_1--(S_n)--R_2--SO_3H$ ”).

Claim 141 is rejected because Andricacos et al. teach that the additive compound has a molecular weight of 1000 or less (col. 6, “organic sulfide compounds of the formula  $XR_1--(S_n)--R_2--SO_3H$ ” and when R1 and R2 are alkyne groups containing 1 carbon atom, X is hydrogen, and n is 2, the molecular weight is ~ 171).

Claim 142-145 are rejected because Andricacos et al. teach that the additive concentration is at least about 5 mg per liter of the electroplating composition (Table II: 3-mercaptopropane-1-sulfonic acid with a concentration of 0.1 g/L = 100 mg/L).

Claims 146-149 are rejected because it would have been obvious and within the ordinary skill in the art at the time the invention was made to have modified Andricacos et al. to increase the additive concentration to at least 15 mg per liter as taught by Dahms et al. because Dahms et al. teach of an SPS (i.e. “3,3-dithiobis-1-propanesulfonic acid disodium salt” or “Bis-(3-sulfopropyl)-disulfide disodium salt”) concentration of between 1 and 50 mg per liter (Table 2: same as 0.001 to 0.05 grams per liter) which would have aided in increasing the brightness of the deposit.

Claim 150 is rejected because Andricacos et al. teach that the electroplating composition further comprises a suppressor agent (col. 6: “polyether”).

Claim 151 is rejected because Andricacos et al. teach that the suppressor agent is a polyether (col. 6).

Claim 152 is rejected because Andricacos et al. teach that the electroplating composition further comprises a halide ion source (col. 7:"chloride").

Claim 153 is rejected because Andricacos et al. teach that the microchip wafer substrate is electrically attached to a cathode of the system (col. 7).

**REMARKS - Response to Arguments**

6. Applicant's arguments with respect to claims 124-153 have been considered but are moot in view of the new ground(s) of rejection.

Applicant submitted a 37 CFR 1.131 declaration to swear behind the Landau et al. reference and was successful in doing so. As a result, Examiner found a new reference to apply to the claims.

In the even that Applicant uses the argument that the secondary references cannot be applied with the primary reference because they apply to circuit boards and not microchip wafers, Examiner must point Applicant to the passage in the primary reference (col. 7) which sets forth the motivation to use prior art bath compositions for use in plating microchip wafers.

Since Applicant provided no meaningful argument in response to the prior art rejections other than the 1.131 declaration, the rejection above stands on its own.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley Nicolas whose telephone number is (571) 272-1247. The examiner can normally be reached on Mon.-Thurs. from 7 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached at (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov> . Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Wesley A. Nicolas  
Primary Examiner

April 27, 2004